DS01-036

Patent claims

1. A charge/discharge protection circuit for a rechargeable battery (1), protected via a fusible link (2), with a control logic (10), which opens or closes a load switch (3) depending on the magnitude of the battery voltage, the potential at the charge/discharge terminals (5, 6) of the protection circuit, **thus characterized** that the control logic (10) comprises an over-voltage detector (14), which closes a short-circuit switch (20) when reaching a predetermined voltage limit which depends on the electric strength of the protection circuit, and where the short circuit switch (20) couples the battery terminals via the fusible link (2).

2. The protection circuit according to claim 1, thus characterized that the over-voltage detector (14) receives as input potential the potential via the opened load-current switch (3).

3. The protection circuit according to claim 1, thus characterized that the over-voltage detector (14) receives as input potential the difference between the potential at the charge/discharge terminals (5, 6) and the potential at the battery terminals.

4. The protection circuit according to one of the claims 1 to 3, thus characterized that, when the voltage limit is exceeded, the control logic (10) closes the

previously open load-current switch (3) followed by the time-delayed closing of the short-circuit switch (20).

5. The protection circuit according to one of the claims 1 to 4, thus characterized that the control logic (10) receives a first supply voltage from the battery and a second supply voltage from an auxiliary voltage source (16), in particular a charged buffer capacitor.

6. The protection circuit according to one of the claims 1 to 5, thus characterized that the over-voltage detector comprises a bistable flip-flop (146).

7. The protection circuit according to claim 6, thus characterized that the output signal of the bistable flip-flop (146) on one hand is fed to delay-element (15) which provides the control signal for the closing of short-circuit switch (20), on the other hand is fed via an inverter (13) to the first input of an AND gate (12) whose output signal controls load switch (3).

8. The protection circuit according to one of the claims 1 to 7, characterized by a resistance (4) as a current sensor to determine the magnitude of the charge or discharge current.

9. The protection circuit according to claim 8, thus characterized that the transmission resistance of the load-current switch (3) is used as the current sensing resistance.

10. The protection circuit according to one of the claims 1 to 9, thus characterized that the control logic (10) comprises a comparator each (D1, D2), to recognize a battery-side over- or under-voltage, and that the comparator output signals trigger the opening of load switch (3) in the event of an over- or under-voltage.

11. The protection circuit according to one of the claims 1 to 10, characterized by a filter capacitor (7) coupled parallel to the charge/discharge terminals (5, 6).

12. The protection circuit according to one of the claims 1 to 11, thus characterized that, with the exception of capacitors, at least all circuit elements of low power losses are integrated on one chip.

13. The protection circuit according to claim 12, thus characterized that, with the exception of capacitors, all parts of the circuit are integrated on the chip, including the load switch (3), the short-circuit switch (20), and the fusible link (2).